

Claims

1. Cathode for high-temperature fuel cell comprising a cathode material with the chemical composition according to the formula $\text{Ln}_{1-x-y} \text{M}_y \text{Fe}_{1-z} \text{C}_z \text{O}_{3-\delta}$

5 wherein

$$0.02 \leq x \leq 0.05,$$

$$0.1 \leq y \leq 0.6,$$

$$0.1 \leq z \leq 0.3,$$

$$0 \leq \delta \leq 0.25$$

10 and wherein Ln = lanthanide, M = strontium or calcium and C = cobalt or copper, wherein the cathode has an average grain size in the range of 0.4 to 1.0 μm .

15 2. The cathode according to claim 1 wherein $0.3 \leq y \leq 0.5$, especially wherein $y = 0.4$.

3. The cathode according to one of claims 1 to 2 wherein $0.15 \leq z \leq 0.25$, especially wherein $z = 0.2$.

4. The cathode according to one of claims 1 to 3 wherein Ln = lanthanum.

20 5. The cathode according to one of claims 1 to 4 wherein M = strontium.

6. The cathode according to one of claims 1 to 5 wherein
C = cobalt.

7. The cathode according to one of claims 1 to 6
comprising $\text{La}_{0.58}\text{Sr}_{0.4}\text{Fe}_{0.8}\text{Co}_{0.2}\text{O}_{3-\delta}$, $\text{La}_{0.55}\text{Sr}_{0.4}\text{Fe}_{0.8}\text{Co}_{0.2}\text{O}_{3-\delta}$,
5 $\text{La}_{0.78}\text{Sr}_{0.2}\text{Fe}_{0.8}\text{Co}_{0.2}\text{O}_{3-\delta}$ or $\text{La}_{0.58}\text{Sr}_{0.4}\text{Fe}_{0.8}\text{Cu}_{0.2}\text{O}_{3-\delta}$.

8. The cathode according to one of claims 1 to 7,
wherein the cathode has an average grain size in the range of 0.6
to 0.8 μm .

9. The cathode according to one of claims 1 to 8 wherein
10 a porosity is equal to between 20 and 40%, especially between 25
and 35%.

10. A method of preparing a cathode according to one of
claims 1 to 9 comprising the steps of:

applying and sintering onto an anode-electrolyte
15 composite a $(\text{Ce}, \text{Gd})\text{O}_{2-\delta}$ powder with an average grain size of less
than 0.8 μm such that a $(\text{Ce}, \text{Gd})\text{O}_{2-\delta}$ intermediate layer results,

applying and sintering onto this intermediate layer a
cathode material with the chemical composition according to the
formula $\text{Ln}_{1-x-y}\text{M}_z\text{Fe}_{1-z}\text{C}_2\text{O}_{3-\delta}$ wherein

20 $0.02 \leq x \leq 0.05,$

$0.1 \leq y \leq 0.6,$

$0.1 \leq z \leq 0.3,$

$0 \leq \delta \leq 0.25$

and wherein Ln = lanthanide, M = strontium or calcium and C = cobalt or copper as powder with an average grain size of less than 2 μm .

11. The method according to claim 10 wherein the cathode material is applied as powder with an average grain size between 0.6 and 0.8 μm .

12. Use of a cathode according to one of claims 1 to 9 in a fuel cell, wherein the cathode is arranged adjacent to a (Ce, Gd) $\text{O}_{2-\delta}$ intermediate layer with a porosity of less than 30%.